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A CONTRIBUTION TO THE STUDY OF THE GENUS *NEZARA* AMYOT & SERVILLE (HEMIPTERA, PENTATOMIDAE)

By Paul Freeman, A.R.C.S., B.Sc., F.R.E.S.

With Thirty Text-figures.

Manuscript received 2nd November, 1939.

(Read 5th June, 1940.)

Introduction and acknowledgements.

In a recent paper on cotton-pest control work in Africa (Munro, 1937) it was pointed out that a considerable amount of cotton-staining is brought about by the Pentatomids *Calidea* Laporte and *Nezara* Amyot & Serville acting as vectors of the fungus spores. It was therefore considered desirable to revise these two genera, in order to facilitate work on control methods.

This account of *Nezara* Am. & Serv., based on a study of the material in the collection of the British Museum, follows an account of the genus *Calidea* Laporte, published in the *Transactions* of this Society (1939, **88** : 139–159).

Most of the material used was that in the British Museum collection, and the work was carried out in the British Museum and the Department of Entomology of the Imperial College of Science and Technology, London, under the direction of Professor J. W. Munro. To him and to Dr. O. W. Richards of the same Department I should like to offer my thanks for help and advice, particularly to Dr. Richards for very kindly reading the manuscript. Thanks are especially due to Mr. W. E. China of the British Museum for his very ready and valuable aid whenever I was in difficulty. Dr. Max Beier lent me a considerable amount of material from the Vienna Museum, including the type of *Rhaphigaster o* Signoret, M. René Malaise lent me the type of *Nezara victorinii* Stål from the Naturhistoriska Riksmuseum, Stockholm, and Professor G. D. H. Carpenter lent me Westwood's types from the Hope Museum, Oxford: to these gentlemen, many thanks are due for their co-operation.

General remarks on the genus *Nezara* Amyot & Serville.

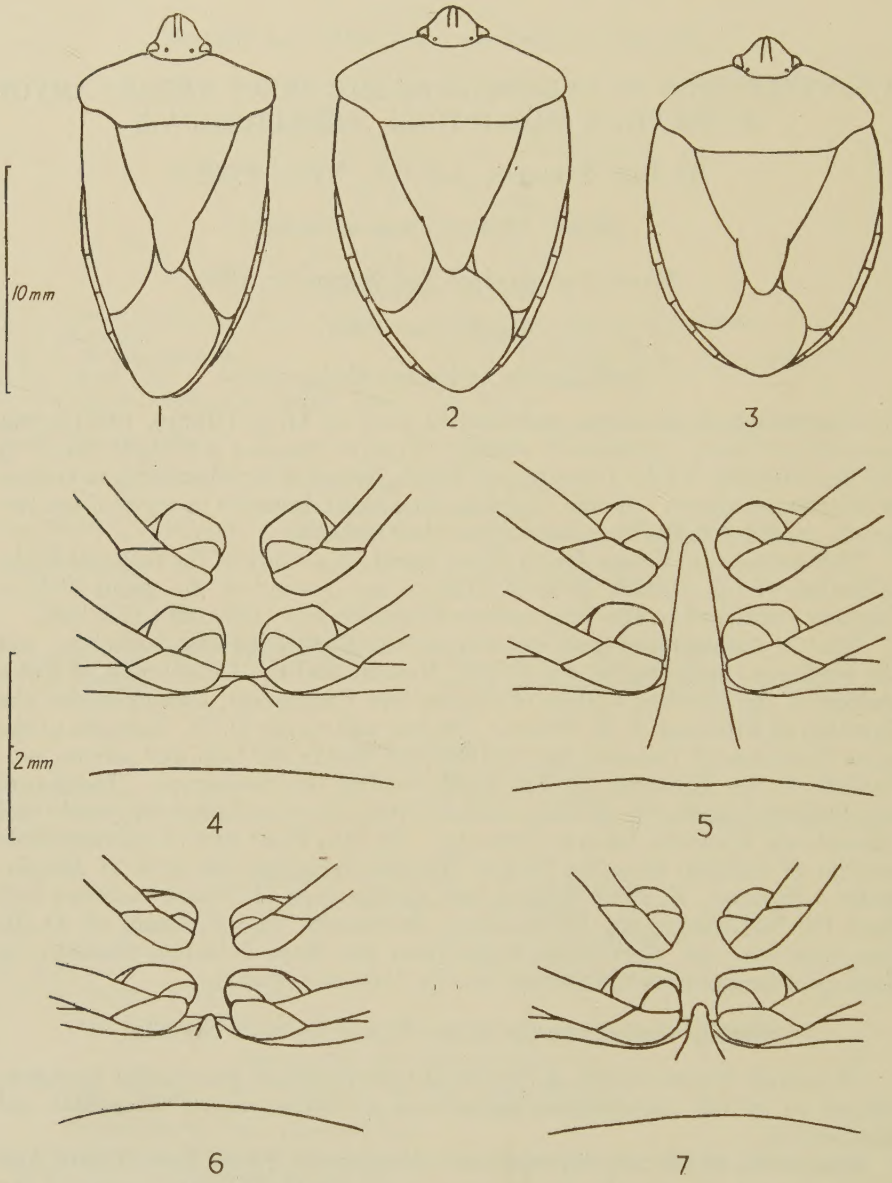
The genus *Nezara* Amyot & Serville (Pentatominae) has usually been considered to include *Acrosternum* Fieber and sometimes also *Pellaea* Stål and *Banasa* Stål.

Stål (1876, **14** (4) : 90–92) separated *Acrosternum* Fieber from *Nezara* Am. & Serv. by the absence of a black spot or line beneath the lateral margin of the head, and he then divided *Nezara* into two groups by the shape of the scent gland orifices.

Sharp (1890 : 406–408) concluded from a study of the male genitalia that *Nezara viridula* (L.) could not be placed in the same genus as the two species of *Acrosternum*, *A. spicata* Distant and *A. marginatum* (Pal. Beauv.).

Kirkaldy (1909 : 115) included in the genus *Nezara* five subgenera : *Nezara*

Am. & Serv., *Acrosternum* Fieb., *Pellaea* Stål, *Banasa* Stål, *Atomosira* Uhler, *Rio* Kirkaldy.



Figs. 1–7.—1–3. Outlines of females of (1) *N. viridula* (L.); (2) *N. robusta* Dist.; (3) *N. o* (Sign.). 4–7. Ventral view of meso- and metacoxae and base of abdomen to show abdominal spine. (4) *N. viridula* (L.); (5) *N. o* (Sign.); (6) *N. naspirus* (Dall.); (7) *N. similis* sp. n.

Bergroth (1914 : 24–26) separated *Nezara* from *Acrosternum* by the shape of the scent gland orifices. Thus his genus *Nezara* corresponds to Stål's (1876)

division (a) of *Nezara*, and his genus *Acrosternum* to division (aa) plus Stål's genus *Acrosternum*. Stål (1876) and Kirkaldy (1909) regarded *Pellaea* Stål as a subgenus of *Nezara* Am. & Serv.; however, Bergroth considered it to be a separate genus, " generically distinct by the structure of the pronotal apical margin, the base of the venter, and the quite different colouring." This conclusion is confirmed by the structure of the parameres of the male genitalia, which are totally different from those of *Nezara*. *Banasa* Stål, including *Atomosira* Uhl. and *Rio* Kirk., is also considered by Bergroth to be generically distinct from *Nezara* Am. & Serv., and this likewise is confirmed by the shape of the parameres.

The genus *Nezara* Am. & Serv. as thus defined by Bergroth contains mainly continental Ethiopian species and no American species, except for the cosmopolitan *N. viridula* (L.). This present account is confined entirely to a description of the genus in this restricted sense. It may readily be separated from the allied genera by the following characters :—

1. Colour normally green, with a variable amount of yellow intermixed and sometimes red or brown.

2. Spout of the metathoracic scent gland short, sometimes slightly elongate, but never reaching beyond the middle of the anterior margin of the metapleuron (figs. 8–12), never drawn out into a narrow ridge ending near the anterolateral corner of the metapleuron (as in *Acrosternum*).

3. Ninth segment of the male clearly visible in ventral view, whereas in *Acrosternum* it is retracted into the abdomen and is hardly visible in ventral view.

4. Parameres of the male genitalia broad and apically turned upwards, the free ends of each being produced into lobes two or three in number (figs. 22–30). The inner faces of the upturned ends are covered by downwardly projecting teeth (fig. 21). The horizontal portion bears a tuft of setae, which in *N. viridula* (L.) (fig. 21) and *N. antennata* Scott are raised on a short projection. The parameres of *Pellaea stictica* (Dallas) also bear downwardly projecting teeth, but there are both upwardly and downwardly projecting apical arms giving an entirely different appearance. In *Banasa subrufescens* (Walker) each paramere has two apical lobes but no teeth and is only slightly upturned. In those species of *Acrosternum* I have examined including *A. acutum* (Dall.), the parameres are of a different form, lacking teeth, and are more or less elongate with an upwardly projecting process before the apex.

I have used the shape of the parameres of the male genitalia as a basis for the separation of the species. The species may, however, be separated in both sexes by other characters. The male genital character is particularly useful, because the parameres offer the best characters when viewed terminally, *i.e.* it is unnecessary to remove the genitalia as they can be seen *in situ*.

I have examined the following types :—

In the collection of the British Museum : *Cimex smaragdulus* Fabricius, *Pentatoma vicaria* Walker, *Nezara antennata* Scott, *N. robusta* Distant, *Zangis niamensis* Distant, *Rhaphigaster naspirus* Dallas, *Nezara orbiculata* Distant.

Westwood's types from the Hope Museum, Oxford : *Pentatoma chlorocephala*, *P. oblonga*, *P. unicolor*, *P. berylina*, *P. subsericea*, *P. leii*, *P. 3-punctigera*, *P. proxima*, *P. chinensis*, *P. propinqua*, *P. frontalis*, *P. africana*, *P. capicola*.

In the collection of the Vienna Museum : *Rhaphigaster o* Signoret (see below in the specific description).

In the collection of the Naturhistoriska Riksmuseum, Stockholm : *Nezara victorinii* Stål.

Nezara Amyot & Serville.

Nezara Amyot & Serville (1843) in part, Reiche & Fairmaire (1848), Fieber (1861), Stål (1865) in part, Mulsant & Rey (1866) in part, Stål (1872) in part, Scott (1874), Stål (1876) in part, Puton (1881) in part, Costa (1884), Horváth (1889), Sharp (1890) in part, Distant (1890a and 1898), Hutton (1898) in part, Distant (1900) in part, Horváth (1900), Distant (1902) in part, Horváth (1903), Schouteden (1905) in part, Kirkaldy (1909) in part, Schouteden (1910) in part, Bergroth (1914).

Cimex Linnaeus (1758) in part, Fabricius (1775) in part, Thunberg (1783) in part, Villers (1789) in part, Fabricius (1798) in part, Wolff (1802) in part, Germar (1837) in part.

Pentatoma Palisot de Beauvois (1805) in part, Westwood (1837) in part, Lucas (1849) in part, Walker (1867) in part.

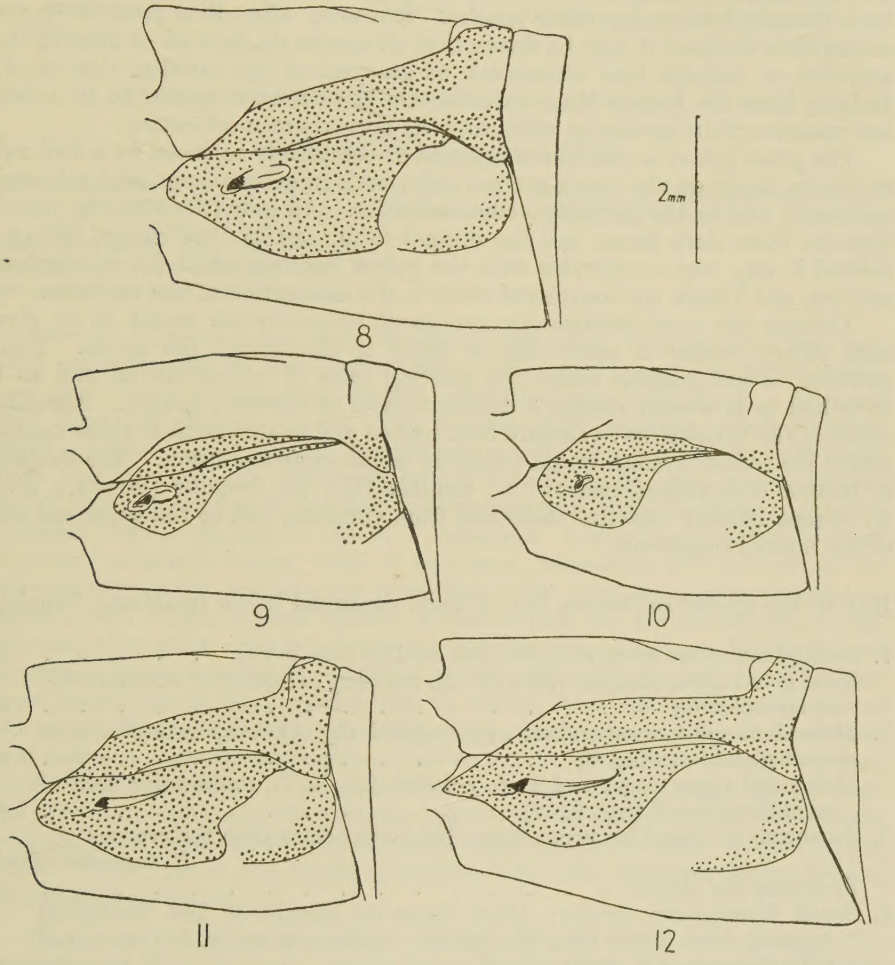
Rhaphigaster Herrich-Schäffer (1839) in part, Dallas (1851) in part, Stål (1853) in part, Signoret (1858) in part.

Genotype *Nezara smaragdula* (Fabricius, 1775) = *Nezara viridula* (Linnaeus, 1758) var. *smaragdula* (Fabricius, 1775) (fixed by Kirkaldy, 1903 : 231).

Characters of *Nezara* Amyot & Serville.

Form. Medium sized, usually broad species (figs. 1–3). *Sculpture.* Punctation strong, punctures arranged in numerous short transverse rows leaving smooth calli between, these calli usually being lighter in colour than the rest of the surface. Punctures of the venter much shallower and much more remote than those of the upper surface. Punctures absent along the mid-ventral line. Whole surface covered by minute scale-like sculpture, visible only under high power. *Head.* Somewhat broad, the three lobes of approximately equal size. Eyes small, ocelli variable, very small in *N. o* (Sign.). Antennae five segmented, first segment short and thick, not reaching to apex of head; second about half as thick as the first and about twice as long; third slightly longer than the second; fourth and fifth subequal and equal to or slightly longer than the third. Basal antennal segment green in colour, second and third red or banded red and green, fourth and fifth dull red often green basally. Rostrum four segmented, reaching practically to base of abdomen, tip lying between the hind coxae; colour, green or yellow, red along the groove, tip of the fourth segment black; second segment the longest, and about twice as long as the fourth, the first and third being intermediate in length. *Thorax.* Lateral margins of prothorax straight or slightly concave, except in *N. o* (Sign.) in which they are slightly convex. At each side of the base of the scutellum there is a shallow, often black, fovea. Metathoracic scent gland spout usually short and ear-like (figs. 8–10), but in *N. o* (Sign.) and *N. frontalis* (Westw.) more elongate and pointed (figs. 11, 12); however, it never reaches beyond the middle of the length of anterior margin of metapleuron. Size of evaporating area of use as a specific character. *Abdomen.* Always keeled ventrally, keel terminating anteriorly in a spine, often short and blunt (fig. 4), but very long in *N. o* (Sign.) (fig. 5). *Male genitalia.* Ninth segment widely emarginate (figs. 13–20) with two diagonal or transverse ridges on ventral surface bearing strong setae; these ridges are well developed in *N. soror* Schout. and *N. frontalis* (Westw.) (figs. 15, 19) so that a deep pocket is formed between the ridges and the edge of the apical emargination. Aedeagus cylindrical and bears terminally two pairs of flattened conjunctiva appendages. Vesica short and cylindrical lying between the conjunctiva appendages. Parameres (figs. 22–30) described above in the account of the genus. *Coloration.* Colour typically green with the calli between the punctures lighter green or yellow, giving a mottled appearance more obvious on the ventral surface. Margin of entire insect, on dorsal and ventral surfaces, narrowly yellow or red, *i.e.* lateral margins of head and pronotum, base of hemielytra, and edge of connexivum. When examined from above, a narrow dark margin appears outside the yellow one; in side view, however, this dark margin is seen really to be colourless and transparent. Lower surface of head bears a black spot just in front of each eye and

above insertion of each antenna. There are three or five small yellow spots across the base of the scutellum and usually some indication of a longitudinal yellow fascia. Legs green, coxae and base of femora yellow, tarsal claws black on their apical half. Membrane of hemielytra colourless, nervures greenish. Keel and spine of abdomen usually broadly yellow, but may be greenish in *N. o* (Sign.). There is a dark green spot at the antero-medial side of each abdominal spiracle. Examined ventrally, there is a row of black



FIGS. 8–12.—Ventral view of meso- and metathoracic pleura to show scent gland spout and evaporating area. (8) *N. viridula* (L.); (9–10) *N. naspirus* (Dall.) showing extremes of variation; (11) *N. frontalis* (Westw.); (12) *N. o* (Sign.).

spots along each margin of the abdomen, one at the apex of each abdominal segment; these spots go over the margin and are just visible from dorsal aspect; they are absent in *N. immaculata* sp. n.

Variation in Colour.

Often the yellow coloration of the calli becomes dominant over the whole of the upper surface or over part of it, producing a number of constant and well-

marked varieties. This spread of yellow colouring affects only the upper surface, whilst the legs, antennae and ventral surface retain their normal coloration. Several of these varieties are not confined to any one species, but are found throughout the genus in the same form in several different species. All of these varieties do not appear in all of the species; I have seen no varieties of *N. o* (Sign.), a species which seems to be very constant in coloration, whereas *N. naspirus* (Dallas) shows numerous varieties, several of which so far have not been described from any other species. However, when it is possible to examine more material it may be shown that all species do show all or most of the varieties, or perhaps that species can be grouped on the varieties they show. Judging from the British Museum collection the varieties appear to be much less common than specimens exhibiting the normal green coloration.

The green colour is sometimes suffused or completely replaced by a dull red or brown, again on the upper surface only, both in otherwise normal coloured specimens and in the partially yellow varieties. All gradations can be found between these dark forms and the normal form, and so they cannot be considered in any way comparable with the yellow varieties which are constant in pattern, and I have not considered them in the description of the varieties.

Perhaps the most satisfactory system of nomenclature would be to give each yellow variety a name and to apply it throughout the genus. This, however, is not possible under the existing rules of nomenclature, and so I have had to give each variety a different name in different species. Actually many of the varieties have already been named and to sink some of these names under the former system would probably cause some confusion. The subject is further complicated because *N. viridula* (L.), *N. frontalis* (Westw.), and *N. robusta* Distant were first described from varieties, and so the types are not of the normal coloration.

Key to the species of *Nezara* Am. & Serv. described below (male and female).

1. Scent gland spout never elongate, but ear-like (figs. 8–10) . . . . . 2.
   Scent gland spout elongate (figs. 11–12), reaching to middle of anterior edge of metapleuron . . . . . 9.
2. Abdominal spine always short and rounded (fig. 4), evaporating area of scent gland large (fig. 8) . . . . . 3.
   Abdominal spine longer and more pointed (figs. 6, 7), evaporating area of scent gland small (figs. 9, 10) . . . . . 8.
3. Pronotum traversed by strong ridges lighter in colour than the grooves *N. niamensis* Dist.
   Pronotum not ridged . . . . . 4.
4. Broad Madagascan species; black spots on margin of first abdominal segment much larger than the spiracle; parameres as fig. 24; antennae with segments 2–5 nearly all red . . . . . *N. soror* Schout.
   Black spots smaller; antennae with definite green bands on some or all segments . . . . . 5.
5. Large robust species (fig. 2); parameres 3-lobed (figs. 25, 26) . . . . 7.
   Smaller narrower species (fig. 1); parameres bilobed (figs. 22, 23) . . . 6.
6. No black on antennae; prothoracic angles not prominent *N. viridula* (L.).
   Antennae banded with black on segments 3, 4, and 5; prothoracic angles prominent; Asiatic species . . . . . *N. antennata* Scott.
7. Black abdominal spots present; margin of whole insect narrowly red; parameres as fig. 25 . . . . . *N. robusta* Dist.
   Black abdominal spots absent; margin only red in reddish-coloured varieties and then broadly so; parameres as fig. 26 . *N. immaculata* sp. n.

8. Abdominal spine shorter (fig. 6); parameres somewhat variable, usually as fig. 27, never as *N. similis* (fig. 28) . . . . . *N. naspirus* (Dallas).
   Abdominal spine longer (fig. 7); parameres as fig. 28 . . *N. similis* sp. n.
9. Abdominal spine short as *N. viridula* (fig. 4); evaporating area large (fig. 11); parameres as fig. 29; smaller narrower species, shape more as *N. robusta* (fig. 2) . . . . . *N. frontalis* (Westw.).
   Abdominal spine elongate, reaching to middle coxae (fig. 5); evaporating area smaller (fig. 12); parameres as fig. 30; large very broad species (fig. 3) . . . . . *N. o* (Sign.).

Systematic account of the species of *Nezara* Amy. & Serv.

Nezara viridula (Linnaeus, 1758).

viridula Linnaeus, 1758 : 444 (*Cimex*). Stål, 1864 : 195, and 1872 : 41 (both as *N. viridula* var. c). Horváth, 1900 : 632 (*Nezara*). Distant, 1902 : 221 (*N. viridula* var. b). Kirkaldy, 1909 : 117 in part (*Nezara*).
hemichloris Germar, 1837 : 166 (*Cimex*).
orbus Stål, 1853 : 221 (*Rhaphigaster*).
prasina Hutton, 1898 : 171 (*Nezara*).

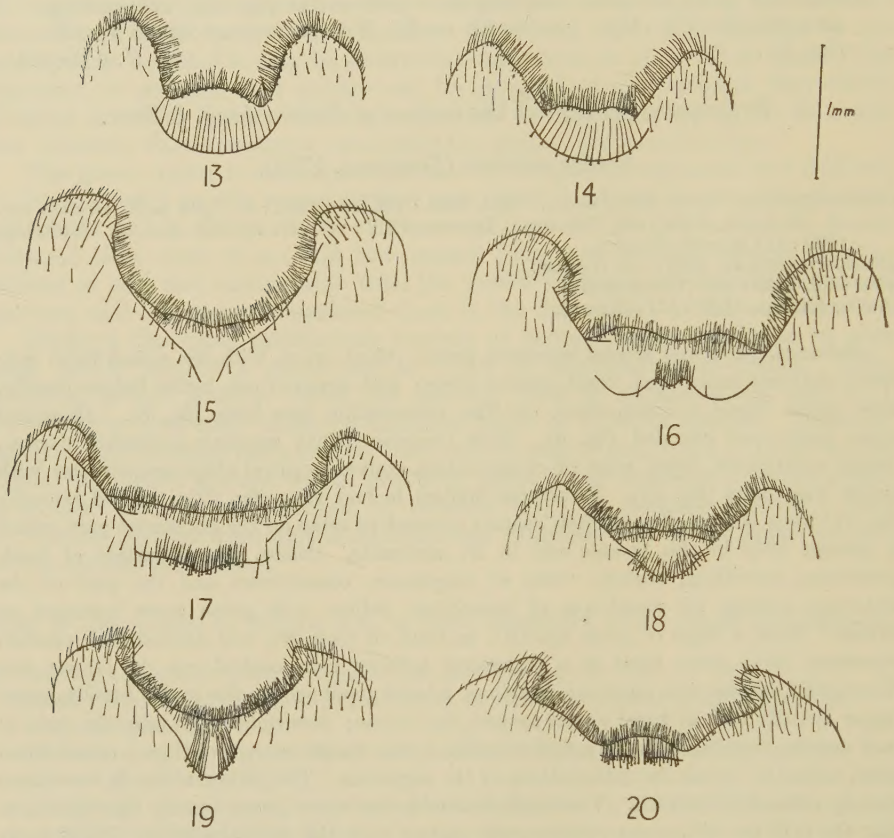
Antennae. First and second segments green; third green, with the apical third red; fourth segment mainly red, basal quarter green; fifth segment red, rather lighter basally. *Scent gland.* Spout medium sized, ear-like, evaporating area large (fig. 8). *Abdominal spine.* Short and rounded (fig. 4). *Male genitalia.* Ninth segment somewhat narrow, deeply emarginate, inner edge of emargination convex, ventral ridge semicircular with sparse long hairs (fig. 13). Parameres bilobed in end view (fig. 22); viewed laterally (fig. 21) there is a small projection bearing a bunch of setae on the horizontal part, which is present only in this species and in *N. antennata.* *Colour.* Dorsal surface of head, pronotum, scutellum, corium, veins of membrane, connexivum and the part of the abdomen covered by membrane of hemelytra, yellow with green spots arranged as follows : *head,* a tinge of green apically, in front of each eye, and around each ocellus; *pronotum,* three green spots in a transverse anterior row, central one the largest and rhomboidal, lateral ones circular; *scutellum,* a large green spot in the centre basally, green tinges apically and at basal angles around the foveae; *hemielytra,* spot near the apex of each corium, forming with the apical scutellar spot a transverse row of three; *connexivum,* green suffusion across the articulations of the segments. The yellow colour is sometimes slightly infused by reddish. Ventral surface of entire insect green, usually light green, so that the calli do not appear conspicuously lighter than the general surface. Black spots along margin of abdomen medium sized, never larger than the spiracles. Abdominal keel yellow. *Length* 12·8–18 mm., *breadth of pronotum* 7–9·5 mm. Elongate, narrow, small to medium-sized species (fig. 1).

This is quite obviously a colour variety, but by the law of priority, the species must take its name, whilst the common green form described below (*smaragdula* (Fabr.)) must receive the status of variety. I have not seen the type.

Distribution of the specimens seen : Basutoland : Maseru, 1 ♀ (*L. Wroughton*). Transvaal : Pretoria, 1 ♀, vii.1915. Rhodesia : Mashona Land, Mt. Chirinda, 1 ♀, xii.1909 (*C. F. M. Swynnerton*). N.E. Rhodesia, 1 ♀, vii.1910 (*S. A. Neave*). S. Africa, 1 ♀; Pirie Bush, 1 ♂ (*A. N. Stenning*). Nyasaland : 3 ♂♂ (*H. H. Stannus*); 1 ♀ (*A. Whyte*); Mlanje, 7 ♂♂, 6 ♀♀, v.1913 (*S. A. Neave*); Pt. Herald, 1 ♂ (*J. E. S. Old*); S. Rukuru River, 1 ♂, vi.1910 (*S. A. Neave*). Tanganyika : 1 ♀ (*W. H. Nutt*). Uganda : Entebbe, 1 ♂, xii.1912 (*C. C. Gowdey*); L. Victoria, Kome I., 1 ♂ (*G. D. H. Carpenter*). Gold Coast : Yapi,

2 ♂♂, xii.1916 (*J. J. Simpson*). INDIA: Sikkim, 1 ♂, 1 ♀; N. Khasia, 1 ♂; Calcutta, 1 ♂; Bombay, 1 ♀ (*Leith*). CEYLON: 1 ♀. CHINA: Hong Kong, 1 ♂. ANNAM: Tonkin Hagiang, 1 ♂, 1 ♀, v.1914 (*R. V. de Salvaza*). EAST INDIES: Celebes, Bankala, 1 ♀ (*J. C. van Hasselt*); Java, 1 ♂ (*Horsfield*); Java, 1 ♀.

Type locality, " in Indiis."



FIGS. 13–20.—Ventral view of apex of ninth segment of male. (13) *N. viridula* (L.); (14) *N. antennata* Scott; (15) *N. soror* Schout.; (16) *N. robusta* Dist.; (17) *N. immaculata* sp. n.; (18) *N. naspirus* (Dall.); (19) *N. frontalis* (Westw.); (20) *N. o* (Sign.).

Nezara viridula var. *smaragdula* (Fabricius, 1775).

smaragdula Fabricius, 1775 : 711 (*Cimex*). Wolff, 1802 : 56 (*Cimex*). Amyot & Serville, 1843 : 143 (*Nezara*). Fieber, 1861 : 330 (*Nezara*). Horváth, 1900 : 632 (as var. of *N. viridula*).
variabilis Villers, 1789 : 505 (part) (*Cimex*).
spirans Fabricius, 1798 : 533 (*Cimex*).
viridissimus Wolff, 1802 : 55 (*Cimex*).
oblonga Westwood, 1837 : 37 (*Pentatoma*).
unicolor Westwood, 1837 : 38 (*Pentatoma*).
berylina Westwood, 1837 : 38 (*Pentatoma*).
subsericea Westwood, 1837 : 38 (*Pentatoma*). Dallas, 1851 : 275 (*Rhaphigaster*).
3-*punctigera* Westwood, 1837 : 38 (*Pentatoma*).
proxima Westwood, 1837 : 38 (*Pentatoma*).
chinensis Westwood, 1837 : 38 (*Pentatoma*).

chloris Westwood, 1837 : 38 (*Pentatoma*).
chlorocephala Westwood, 1837 : 38 (*Pentatoma*).
propinqua Westwood, 1837 : 39 (*Pentatoma*).
plicaticollis Lucas, 1849 : 87 (*Pentatoma*).
approximata Reiche & Fairmaire 1849 : 443 (*Nezara*).
viridula Stål, 1864 : 193, 1872 : 41 (both as var. a of *N. viridula*). Stål, 1876 : 91 (*Nezara*). Puton, 1881 : 66 (*Nezara*). Distant, 1900 : 813 and 1902 : 220 (*Nezara*). Kirkaldy, 1909 : 117 (part) (*Nezara*).
prasina Mulsant and Rey, 1866 : 295 (*Nezara*).
viridis Scott, 1874 : 290 (*Nezara*).

Similar to the type in all structural characters, only differing in colour.

Colour. Antennae and ventral surface similar to type. Entire dorsal surface of head, thorax, wings and abdomen lightish green, *i.e.* of the normal coloration. Reddish-brown forms occur, a dark one of which was named *Pentatoma chlorocephala* by Westwood.

This is by far the most common variety of *N. viridula* which is the commonest and most widespread species. It is found in every continent, though in Europe

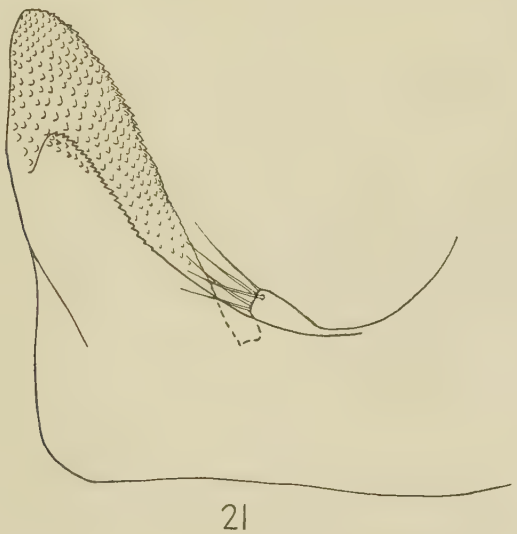


Fig. 21.—Lateral view of right paramere of *N. viridula* (L.) (high power).

only in the south, and has also spread to many islands in the Pacific and elsewhere.

I have seen the type in the Banks' Collection in the collection of the British Museum. I have also seen all of Westwood's types, which are in the Hope Museum, Oxford.

Distribution of the specimens seen (details omitted) : Union of South Africa, 4 ♂♂, 11 ♀♀; West Africa, 1 ♀; S. Rhodesia, 1 ♀; N. Rhodesia, 5 ♂♂, 6 ♀♀; Portuguese East Africa, 2 ♂♂, 5 ♀♀; Nyasaland, 67 ♂♂, 38 ♀♀; Angola, 3 ♂♂, 1 ♀; Congo, 2 ♂♂, 4 ♀♀; Zanzibar, 1 ♂; Uganda, 16 ♂♂, 27 ♀♀; Kenya, 4 ♂♂, 4 ♀♀; Abyssinia, 2 ♂♂; Somaliland, 1 ♀; Nigeria, 5 ♂♂, 4 ♀♀; Gold Coast, 22 ♂♂, 10 ♀♀; Egypt, 3 ♂♂, 7 ♀♀; Morocco, 1 ♀; St. Helena, 1 ♂; Madagascar, 8 ♂♂, 1 ♀; Reunion Is. 1 ♂; Mauritius, 1 ♂, 3 ♀♀; Seychelles, 3 ♂♂, 2 ♀♀; Canaries, 2 ♂♂, 1 ♀; Madeira, 3 ♂♂, 4 ♀♀. Europe : Portugal, 1 ♀; Azores, 2 ♀♀; Italy, 1 ♂; Sicily, 1 ♀; Yugoslavia, 1 ♂, 1 ♀; Greece, 4 ♂♂, 1 ♀. Arabia, 1 ♂, 2 ♀♀;

S.W. Caspian, 1 ♂, 1 ♀; India, 4 ♂♂, 9 ♀♀; Ceylon, 10 ♂♂, 9 ♀♀; Malaya, 1 ♂, 1 ♀; China, 1 ♂, 6 ♀♀; Korea, 1 ♂; Formosa, 1 ♀; Sumatra, 1 ♂, 1 ♀; Borneo, 6 ♀♀; Java, 2 ♂♂, 2 ♀♀. Australasia: N.S. Wales, 1 ♂, 1 ♀; Queensland, 1 ♀; Celebes, 1 ♂, 1 ♀; Papua, 10 ♂♂, 9 ♀♀. West Indies: Trinidad, 1 ♂; St. Vincent, 7 ♂♂, 7 ♀♀; St. Kitts, 1 ♂; Barbados 1 ♂, 1 ♀; Dominica, 1 ♀; Grenada, 6 ♂♂, 7 ♀♀; Grenadines, 2 ♂♂; Antigua, 1 ♂; Virgin Is., 1 ♀; Bermuda, 1 ♂, 2 ♀♀. Costa Rica, 1 ♂; Venezuela, 2 ♀♀.

Type locality, Madeira.

Nezara viridula var. *torquata* (Fabricius, 1775).

torquata Fabricius, 1775 : 710 (*Cimex*). Herrich-Schäffer, 1839 : 100 (*Rhaphigaster*). Puton, 1881 : 66 (*N. viridula* var.). Horváth, 1900 : 632 (*N. viridula* var.). Kirkaldy, 1909 : 117 (*N. viridula* var.).
transversus Thunberg, 1783 : 40 (*Cimex*).
variabilis Villers, 1789 : 505 (part) (*Cimex*).
flavicollis Palisot de Beauvois, 1805 : 185 (*Pentatoma flavicornis* on the plate, pl. xi, f. 5).
vicaria Walker, 1867 : 303 (*Pentatoma*).
viridula Stål, 1864 : 194 and 1872 : 41 (both as *N. viridula* var. b). Distant, 1902 : 220 (*N. viridula* var. a).
hepatica Horváth, 1903 : 406 (*N. viridula* var.).

Similar to the type in all structural characters, differing only in colour.

Colour. Antennae and ventral surface, similar to the typical form. On the dorsal surface, head yellow anterior to a curved line joining the eyes, usually the yellow recedes along the middle lobe; pronotum yellow anterior to a curved line joining the posterior angles so that the lateral and anterior margins are completely yellow, the posterior yellow boundary has 3 or 4 crenulations. Yellow often continued along base of hemielytra and along connexivum, sometimes forming a complete yellow border. Rest of the coloration normal, as in var. *smaragdula*. The brown form of this variety is the *Pentatoma vicaria* of Walker and the var. *hepatica* of Horváth.

I have not seen Fabricius' type. I have seen Walker's type of *Pentatoma vicaria* in the British Museum.

Distribution of the specimens seen (details omitted): Natal, 2 ♀♀; Orange River Colony, 1 ♀; Transvaal, 2 ♀♀; West Africa, 1 ♀; S. Rhodesia, 2 ♂♂, 1 ♀; Angola, 2 ♀♀; Portuguese E. Africa, 1 ♀; Nyasaland, 18 ♂♂, 21 ♀♀; Congo, 1 ♂; Uganda, 4 ♂♂, 7 ♀♀; Kenya, 1 ♂, 1 ♀; Gold Coast, 5 ♂♂, 2 ♀♀; Sierra Leone, 1 ♀; Sudan, 1 ♀; Egypt, 1 ♂; Morocco, 1 ♂, 1 ♀; Azores, 1 ♂; Canaries, 1 ♂. Europe: Gibraltar, 1 ♂; Corsica, 2 ♀♀; Malta, 1 ♂; Greece, 1 ♀. Turkey, 1 ♀; Syria, 1 ♂; India, 6 ♀♀; Siam, 1 ♂; China, 1 ♂ 1 ♀. Japan, 1 ♀; Borneo, 1 ♀; Sumatra, 2 ♀♀; Java, 2 ♂♂, 4 ♀♀; Christmas I., 1 ♀; Celebes, 2 ♀♀. Santo Domingo, 1 ♀.

Type locality, India.

Nezara viridula var. *aurantiaca* (Costa, 1884).

aurantiaca Costa, 1884 : 58 (*N. viridula* var.). Kirkaldy, 1909 : 117 (*N. viridula* var.).

I have seen no specimens of this golden variety, which was described from Sardinia.

Nezara antennata Scott, 1874.

antennata Scott, 1874 : 299 (*Nezara*). Stål, 1876 : 91 (*Nezara*). Distant, 1902 : 221 (*Nezara*). Kirkaldy, 1909 : 116 (*Nezara*).

Antennae. First and second segments green; third green with the apical third black; fourth green, with the apical half black; fifth with the apical two-thirds black, often the

extreme apex and the basal green are tinged with yellow. *Scent gland.* Spout medium sized, ear-like, evaporating area large, as *N. viridula* (fig. 8). *Abdominal spine.* Short and rounded, as *N. viridula* (fig. 4). *Male genitalia.* Ninth segment somewhat similar to *N. viridula* but emargination slightly broader and the base of the emargination is itself shallowly emarginate in the middle (fig. 14). Parameres strongly bilobed (fig. 23); in lateral view there is a small projection bearing a tuft of setae as in *N. viridula*. *Colour.* There are two colour varieties (see below). Type of the normal green colour as follows: dorsal and ventral surfaces green, no distinct contrasts on ventral surface between green of general surface and the calli. Black spots along margin of abdomen medium sized. No obvious light scutellar stripe. Yellow margin to whole insect, and abdominal keel yellow. Brown forms, in which the green of the upper surface is clouded with reddish-brown, occur. *Length* 12–17 mm., *breadth of pronotum* 7–10 mm. Medium sized to small species. Prothorax broad, lateral angles more prominent than in any other species.

Easily separated from the other species of the genus, as it is the only species with black on the antennae. Asiatic in distribution, this and *N. viridula* being the only species so far recorded from Asia.

Type (female) in the British Museum.

Distribution of the specimens seen: CEYLON: 1 ♂. CHINA: 1 ♀; Kiukiang, 28 ♂♂, 39 ♀♀ (*J. H. Leach*). JAPAN: 3 ♂♂, 5 ♀♀.

Type locality, Japan.

Nezara antennata var. *icterica* Horváth, 1889.

icterica Horváth, 1889 : 31 (*N. antennata* var.). Kirkaldy, 1909 : 116 (*N. antennata* var.).

Structural characters, colour of antennae and ventral surface, similar to those of the typical form. Colour of upper surface yellow, with green spots arranged exactly as in *N. viridula* typical form, *i.e.* a row of three across the prothorax, a row of three across base of scutellum, another row of three formed by a central one on the tip of the scutellum and a lateral one on each corium, and tinges of green on the head and connexivum.

Easily distinguished from the typical form of *N. viridula* by the specific characters, especially the antennae.

I have not seen the type.

Specimen seen: INDIA: Calcutta, 1 ♂ (*Atkinson*).

Type locality, Himalaya. Horváth also refers to a specimen from Japan.

Nezara antennata var. *balteata* Horváth, 1889.

balteata Horváth, 1889 : 32 (*N. antennata* var.). Kirkaldy, 1909 : 116 (*N. antennata* var.).

Structural characters, colour of antennae and ventral surface similar to typical form. Colour of dorsal surface green with anterior halves of head and prothorax yellow, *i.e.* pattern similar to that of *N. viridula* var. *torquata* (Fabr.).

Again, easily distinguished by antennae, which keep their black colouring.

I have not seen the type.

Specimens seen: INDIA: Calcutta, 1 ♀; N. India, 1 ♀. CHINA: Kiukiang, 3 ♂♂, 3 ♀♀ (*J. H. Leach*). JAPAN: 1 ♀.

Type locality, Himalaya. Horváth also refers to a specimen from Japan.

Nezara soror Schouteden, 1905.

soror Schouteden, 1905 : 53 (*Nezara*). Kirkaldy, 1909 : 117 (*Nezara*).

I have been unable to see the type of this species, which except for *N. viridula* (L.) is the only species so far described from Madagascar. There is

a number of specimens of a species from Madagascar in the British Museum collection which correspond with Schouteden's description, except that the length he gave (13·5 mm.) is much shorter, though the width (9 mm.) is similar. Hence his insect would presumably be more circular even than *N. o* (Sign.). From his description, which says that both scent gland orifice and abdominal spine are short, he obviously cannot be referring to the latter species. My lengths are given to the wing tip, but it is possible that his were only to the tip of the abdomen, which would make up the necessary deficit. I am therefore regarding the British Museum specimens as belonging to *N. soror* Schouteden until the type can be examined to verify this.

Antennae. First segment green, apex reddish; all other segments red with occasional tinges of green. *Scent gland.* Spout medium sized, ear-like, evaporating area large, as *N. viridula* (fig. 8). *Abdominal spine.* Short and rounded, as *N. viridula* (fig. 4). *Male genitalia.* Ninth segment (fig. 15) with deep semicircular apical emargination; ventral ridges very strongly developed, somewhat similar in this respect to *N. frontalis* (Westw.) but in the specimens I have examined lacking the strong close set setae of this species. Parameres (fig. 24) characteristic. *Colour.* Dorsal surface dark green, ventral surface lighter. Central light fascia on scutellum just visible. Black spots along margin of abdomen larger than in any other species, those on the basal two or three segments are the largest and are nearly twice as large as the whole spiracle. Abdominal keel yellow. I have seen one yellow colour variety (see below). *Length* 15·2–18 mm., *breadth of pronotum* 9–10·3 mm. Broad, medium sized to large species, easily identified by colour of antennae and size of marginal abdominal spots. So far only known from Madagascar, except for one specimen probably erroneously labelled W. Africa.

Distribution of the specimens seen: Madagascar: Fianarantsoa, 11 ♂♂, 11 ♀♀; Sikora, 2 ♀♀; N. Madagascar, 1 ♂, 1 ♀; ? locality, 1 ♀. "West Africa," 1 ♂.

Type locality, Tamatave, Madagascar.

Nezara soror var. **flava** var. n.

Colouring of ventral surface, size of black marginal abdominal spots, and structural characters similar in all respects to those of the typical form above, though as I have only seen a female I cannot vouch for the male genitalia but I see no reason to doubt their similarity. Upper surface wholly yellow with green spots arranged as in the typical form of *N. viridula* (L.), *i.e.* apex of head and around eyes, green; three green spots across anterior part of pronotum, the middle one being the largest and more or less oval; a large green spot at the centre of the base of scutellum, and a small one at each side of the base; a row of three across posterior part of insect, similar to pronotal row, formed by a central spot on apex of scutellum and one towards apex of corium of each hemielytron; connexivum tinged with green at articulation of the segments. Antennae unfortunately broken off in the only specimen I have examined.

Type in the collection of the British Museum, female, from N. Madagascar (Distant Collection).

Nezara robusta Distant, 1898.

robusta Distant, 1898 : 307 (*Nezara*). Kirkaldy, 1909 : 121 (*Nezara*).

Antennae. First segment green; second segment green, usually with narrow basal and apical rings of red; third, green with the apical quarter red; fourth and fifth segments either wholly yellowish-red, or with the base only of the fourth green. *Scent gland.* Spout medium sized, ear-like, evaporating area large, as *N. viridula* (fig. 8). *Abdominal*

spine. Short and rounded, as *N. viridula* (fig. 4). *Male genitalia.* Ninth segment (fig. 16) emargination wide and shallow, with a tooth on each side; ventral ridge drawn up into a crest emarginate in the middle, bearing strong setae. Parameres large and three lobed (fig. 25). *Colour.* Type a modification of the yellow variety seen in *N. viridula* typical form. Dorsal surface with whitish-yellow background streaked with green; streaks concentrated around the places occupied by green spots in *N. viridula* typical form, except on the head; however, in *N. robusta* spots not discrete; on the pronotum they form three longitudinal bands reaching the posterior margin and there are indications of another band each side; basal and apical spots of scutellum joined to form a central green band, somewhat narrowed in the middle; lateral scutellar spots extended along the sides of the scutellum; none of the bands sharply defined; head with no definite concentrations, but with a general infusion of green; connexivum with green around the articulations of the segments. Rest of dorsal surface flecked and streaked with green. The green colour, in this species on both dorsal and ventral surfaces and legs, may be replaced by dull red-brown, to form brown varieties of all shades; the antennae retain their normal green colour in these red forms. Ventral surface of a more or less uniform yellowish-green. Marginal band round the whole insect red, both on dorsal and ventral surfaces, sometimes narrow and almost missing; brighter red in the brown forms; abdominal keel yellow, Black spots along margin of abdomen small to medium sized. *Length* 14·8–18 mm., *breadth of pronotum* 9·2–10·8 mm. A large species, broad across the prothorax but somewhat contracted posteriorly (fig. 2).

Type (female) in the British Museum collection.

Distribution of the specimens seen: NYASALAND: Mlanje, 1 ♂, viii.1913 (*S. A. Neave*); Zomba, 1 ♀ (*Rendall*), 1 ♀ (*Cameron*); Blantyre, 1 ♀; Nyika Mts., 1 ♀ (*A. White*); ? locality, 1 ♂, 3 ♀♀ (*H. H. Stannus*). S. RHODESIA: Umtali, 1 ♂.

Type locality, S. RHODESIA: Mashonaland, Salisbury (*G. Marshall*).

Nezara robusta var. **virescens** var. n.

***robusta* var. Distant, 1898 : 307.**

This is the normal green form corresponding to *N. viridula* var. *smaragdula.* Colour of dorsal surface uniform light or dark green; calli between the punctures not obviously lighter than the rest of the surface. Colour of ventral surface, legs, antennae, red marginal band, black marginal abdominal spots, also all specific structural characters similar in all respects to the type variety above; also the green of both dorsal and ventral surfaces, though not of the antennae, may be replaced or suffused by reddish-brown in a similar manner, though of course in this form the whole of the upper surface becomes reddish; in the red forms the red marginal band is also much brighter.

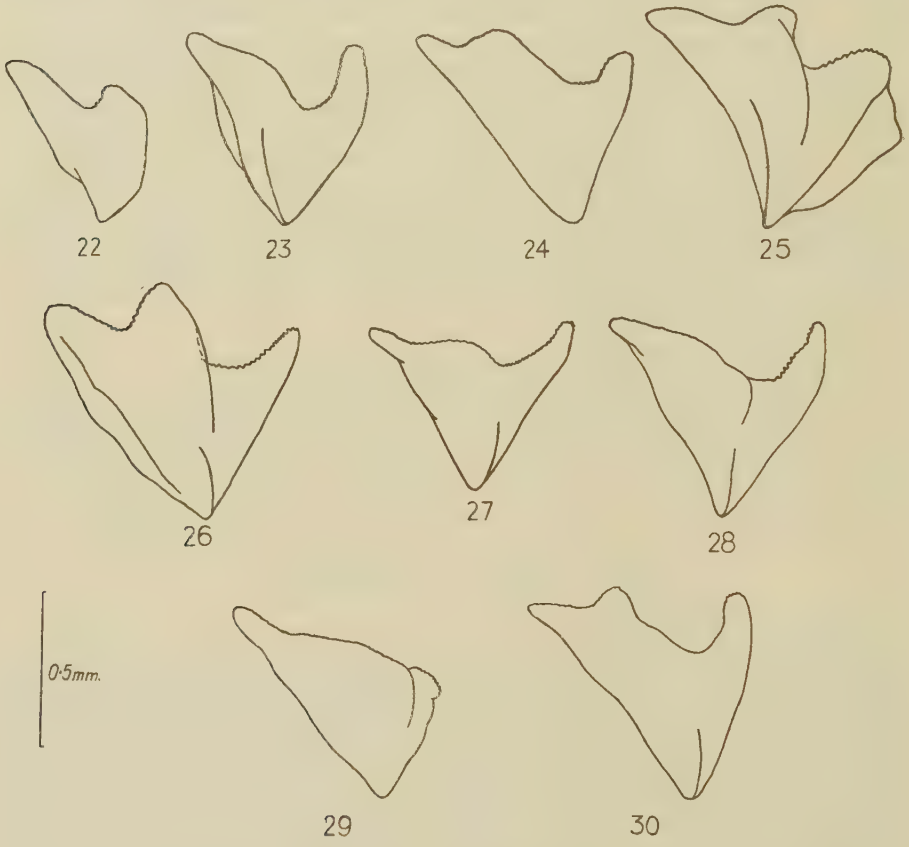
Type (male), from NYASALAND: Blantyre, in the British Museum. Allotype, female, same locality. Paratypes: NYASALAND: Mlanje, 1 ♂, 1 ♀, iii.1913, 1 ♀, iv.1913 (*S. A. Neave*); Kondowe-Karonga, 3 ♀♀, vi.1896 (*A. Whyte*); Nyika Mts., 4 ♀♀, vii.1896 (*A. Whyte*); Zomba, 1 ♀ (*P. Rendall*), 2 ♂♂, 1 ♀, 1914 (*H. S. Stannus*); Blantyre, 1 ♂, 3 ♀♀; ? locality, 3 ♀♀, 1913 (*H. H. Stannus*). N.E. RHODESIA: 1 ♂, 1 ♀, vi.1910 (*S. A. Neave*); Umtali, 1 ♀.

Nezara robusta var. **thoracica** var. n.

Dorsal surface green with a yellow band across the anterior third of the pronotum in front of a curved line joining the posterior angles; yellow continued posteriorly so that base of hemelytra and more than half of connexivum are yellow; the red margin to the

whole insect, seen in the other varieties, is only present as occasional spots on the dorsal surface, but is present below the margin. Head entirely green. Colour of ventral surface and antennae, and all structural characters (of the female at any rate), similar to the typical form above, though red of antennae somewhat infused with yellow.

Presumably this variety corresponds to a modification of the variety seen in *N. viridula* var. *torquata*, just as the type variety seems to be a modification of the green spotted yellow form seen in *N. viridula* type. A similar pattern is seen in *N. naspirus* var. *flavocincta* var. n.



Figs. 22–30.—Terminal view of right parameres. (22) *N. viridula* (L.); (23) *N. antennata* Scott; (24) *N. soror* Schout.; (25) *N. robusta* Dist.; (26) *N. immaculata* sp. n.; (27) *N. naspirus* (Dall.); (28) *N. similis* sp. n.; (29) *N. frontalis* (Westw.); (30) *N. o* (Sign.).

I have seen one specimen, the type, in the British Museum collection. It is a female from Nyasaland, Kambove–Katanga, 3.iv.1907 (*Neave*).

Nezara immaculata sp. n.

Antennae. In the normal green form as follows: first and second segments green; third segment two-thirds green, apical third dull red; basal quarter of the fourth green, the rest of the fourth and the whole of the fifth segment dull red. Specimens of the red form (see below) have the second and third segments bright red, which colour encroaches

on the duller fourth and fifth segments. *Scent gland.* Spout medium sized, ear-like, evaporating area large, as *N. viridula* (fig. 8). *Abdominal spine.* Short and rounded, as *N. viridula* (fig. 4). *Male genitalia.* Ninth segment (fig. 17) emargination wide and shallow; ventral ridge not as pronounced as in *N. robusta*, widely emarginate and bearing strong setae. Parameres large and three lobed (fig. 26), somewhat similar to *N. robusta* but easily separated by examination of the figures. *Colour.* Light green on both dorsal and ventral surfaces, with the calli obviously much lighter, giving the whole insect a slightly mottled appearance; scutellum with obvious median yellow fascia. Marginal band round the whole insect broadly yellow; abdominal keel light yellow. Black spots along margin of abdomen completely absent, which forms a useful specific character. I have seen no yellow colour varieties, but I have seen two specimens exhibiting distinctive red coloration as follows: green coloration on all parts of the insects, including legs, antennae, dorsal and ventral surfaces, suffused with red; green distinguishable through red especially on the head, across front of pronotum, and on thoracic pleura; yellow of the calli particularly obvious, especially on the scutellum, giving a very mottled appearance; yellow margin round whole insect replaced by a broad bright red one, much broader than the similar margin of *N. robusta*; antennae (see above) red, except for basal segment. *Length* 16–16·5 mm., *breadth of pronotum* 9·2–9·4 mm. A large species somewhat resembling *N. robusta*; however, thorax narrower in proportion to the length. Easily separated from *N. robusta* by lack of marginal abdominal spots and by the male genitalia.

Type, male, from C. Abyssinia: Lake Zwai, v.1914 (*O. Kovacs*); allotype, female, same data, both in the British Museum collection. Paratypes, 1 ♂, 1 ♀, same data as type; Uganda, 1 ♀, 1913 (*C. H. Marshall*); Kenya: Mt. Kenya, 1 ♂, viii–x.1927 (*A. Insoll*) red form, E. foot and slopes Aberdare Mts., 1 ♂, ii.1911 (*S. A. Neave*) red form.

Nezara niamensis (Distant, 1890).

niamensis Distant, 1890b : lvii (*Zangis*). Kirkaldy, 1909 : 116 (*Nezara*).

Antennae. First segment green; second variable, either completely red, or green, and red at base and apex; third green with the apical third red; fourth green at the base, merging through yellowish to red at the apex; fifth wholly yellowish-red. *Scent gland.* Spout medium sized, ear-like, evaporating area large, as *N. viridula* (fig. 8). *Abdominal spine.* Short and rounded, as *N. viridula* (fig. 4). *Male genitalia.* I have seen no males. *Colour.* Dorsal surface green; pronotum and scutellum crossed by strong transverse ridges lighter in colour than the grooves between; hemelytra with light and dark green forming a characteristic reticulate pattern; ventral surface uniformly yellowish; abdominal keel yellow; black marginal spots present in the type, but absent in the specimen from Nigeria (see below). I have seen no yellow varieties or brown forms. *Length* 15·5–18·1 mm., *breadth of pronotum* 9–10 mm.

The grooving of the dorsal surface is very well marked in the type, which can thus be separated from the other species extremely easily. However, in the two other specimens I have seen, although still strong, it is not quite so well marked, and added to this the specimen from Nigeria has no black abdominal spots. Both of these specimens resemble in form *N. immaculata* which I have described above as a new species. Thus it is possible that *N. immaculata* is the normal form of *N. niamensis*, which name of course has priority, but this cannot be established with any certainty until a male with ridged pronotum can be examined.

Type in the British Museum collection, female, from Niam-Niam (*Bohndorff*), Distant Coll. Other specimens seen: Uganda: Tororo, 1 ♀, 18.xi.1910 (*C. C. Gowdey*); N. Nigeria: Banchi Province, Panyam, 1 ♀ (*G. T. Fox*).

Nezara naspirus (Dallas, 1851).

naspirus Dallas, 1851 : 276 (*Rhaphigaster*). Kirkaldy, 1909 : 121 (*Nezara*).
victorinii Stål, 1876 : 91 (*Nezara*) **syn. n.** Kirkaldy, 1909 : 117 (*Nezara*).

Antennae. First and second segments completely green or yellowish; third, green basally, apical third red; fourth, green on basal third, rest of fourth and whole of fifth red suffused with yellow basally. Intersegmental membrane between first and second, and second and third segments sometimes tinged with red. *Scent gland.* Somewhat variable, but quite distinct from all other species of the genus except *N. similis* (see below). Spout shorter than *N. viridula* sometimes very short and almost lacking; evaporating area very small, limits of variation shown by figs. 9, 10. *Abdominal spine.* Conical (fig. 6), shorter than *N. similis* but more prominent than *N. viridula*. *Male genitalia.* Variable, but quite distinct from all other species except *N. similis*. Ninth segment usually as in fig. 18, but sometimes the ventral ridges are more strongly developed, and the emargination may be deeper. Parameres 3-lobed, usually as fig. 27, but sometimes the central lobe is more pronounced, and the right-hand (outer) lobe a little thicker, but never two lobed with a deep division between the lobes as *N. similis* (fig. 28). *Colour.* Dorsal surface usually light green with the calli conspicuously lighter or yellow; however, it is sometimes dark with less conspicuous calli; yellow scutellar fascia present to a greater or lesser extent (see below under var. *scutellaris*); ventral surface very distinctly blotched with yellow and green; margin to entire insect yellow; yellow keel to abdomen; black spots along abdominal margin medium sized to small, never larger than the whole spiracle. I have seen no red forms. There are eight or nine well-marked colour varieties. *Length* 12–15·3 mm., *breadth of pronotum* 7–9·5 mm. A small- to medium-sized species, easily identified by the scent gland and abdominal spine.

Type, male, in the British Museum collection. I have also seen the type of *N. victorinii* Stål, which Stål separated from *N. frontalis* (Westw.) by the shape of the scent gland orifice; it is a small light green female and does not seem to differ in any notable way from *N. naspirus*; it is from Cape of Good Hope.

Distribution of the specimens seen : Cape of Good Hope : Pondo Land, Pt. St. John, 4 ♂♂, 4 ♀♀, vii–ix.1923, 1 ♀, v.1923 (*R. E. Turner*); Mossel Bay, 1 ♀, ix.1924 (*R. E. Turner*). Natal : Karkloof, 1 ♂, 9.ii.1897; Malvern, 1 ♀, x.1897; Pt. Shepstone, 1 ♂, 10.iv.1897; Zululand, Eshwe, 1 ♂, vii.1926; Natal, 1 ♂, 1 ♀ (*Distant coll.*). Nyasaland : Zomba, 1 ♀, ii.1896 (*A. Whyte*); Mlanje, 1 ♀, 27.xii.1912, 1 ♂, 5.xii.1913 (*S. A. Neave*); 6 ♂♂, 7 ♀♀, 1913 (*H. H. Stannus*). Congo : Kambove–Katanga, 1 ♂, 11.iii.1907. Tanganyika : Bukoba, 1 ♀, 9.vi.1912 (*C. C. Gowdey*). Kenya : Aberdare Mts., 1 ♂, ii.1911 (*S. A. Neave*), Katamayo, 1 ♀, x.1934 (*F. W. Edwards*); Mt. Kenya, 1 ♀, 16.ii.1911 (*S. A. Neave*). Uganda : Kampala, 5 ♂♂, 1 ♀, x.1917, 3 ♂♂, iii.1918 (*C. C. Gowdey*); Kafu River, 1 ♀, 29.xii.1911 (*S. A. Neave*); E. Ruwenzori, 1 ♂, 2.ii.1906 (*Legge & Wollaston*). Abyssinia : L. Zwai, 1 ♂, 1 ♀, v.1914, Maraquo, 2 ♂♂, 26.vi.1914 (*O. Kovacs*); Cameroons : Mt. Cameroon, 1 ♂, 1 ♀, ii.1932 (*M. Steele*).

Type locality, S. Africa.

Nezara naspirus var. *subviridula* Schouteden, 1910.

subviridula Schouteden, 1910 : 89 (*N. naspirus* var.).

I have seen no specimens of this variety. From the description it resembles the type of *N. viridula*, *i.e.* dorsal surface yellow with green spots, one by each

eye, three across the front of the pronotum, apparently two only on the scutellum, and one near the middle of each corium.

Type locality, TANGANYIKA : Usambara.

Nezara naspirus var. *subtorquata* Schouteden, 1910.

subtorquata Schouteden, 1910 : 89 (*N. naspirus* var.).

Similar pattern to *N. viridula* var. *torquata* (Fabr.). Dorsal surface green as in the type variety, with a yellow band across the head anterior to the eyes, and across the pronotum anterior to a curved line joining the posterior angles. In one of the specimens I have examined, the yellow is continued as a very narrow margin around the insect, in the other the margin is brownish. In the former specimen the second and third antennal segments are yellowish with red flecks, otherwise all other characters resemble the type variety.

I have not seen the type which was described from TANGANYIKA : Kilima Njaro.

Specimens seen : NATAL : Durban, 1 ♀, (*Bell-Morley*). UGANDA : E. Ruwenzori, 1 ♀, 15.i.1906 (*Legge & Wollaston*).

Nezara naspirus var. **flavocincta** var. n.

Dorsal surface green, with a band on the anterior part of the pronotum exactly similar to that of var. *subtorquata* above; head entirely green; yellow pronotal band continued as a broad band round entire insect (excluding the head), occupying the base of the clavus and the whole connexivum, and is carried broadly over margin of abdomen. Antennae and other characters of female similar to those of the type variety. I have seen no males.

Type, female, NYASALAND : Mlanje, 2.vi.1913 (*S. A. Neave*). Paratype, ♀, UGANDA : Kafu River nr. Hoila, Kampala Rd., 31.xii.1911 (*S. A. Neave*). Both are in the British Museum.

Nezara naspirus var. **rufoguttata** var. n.

Dorsal surface of the normal green colour, but with large dull red spots arranged as follows : two on the pronotum, one behind each callus; one at each basal angle and one at the apex of the scutellum. All other characters (female) similar to the type variety.

Type, female, NYASALAND, 1911 (*H. H. Stannus*), in the British Museum.

Nezara naspirus var. **maculata** var. n.

Dorsal surface, including the head, yellow, going over the margin on to the ventral surface; there are five large dull red spots arranged exactly as in var. *rufoguttata* above, *i.e.* two on the prothorax and three on the scutellum; also two large green spots, one near the apex of each corium as in var. *subviridula*. Colour of rest of insect and all other characters including male genitalia, normal.

Type, male, NYASALAND : Mlanje, 1.xii.1913 (*S. A. Neave*). I have seen no other specimens. Type in the British Museum.

N. naspirus var. *scutellaris* Schouteden, 1910.

scutellaris Schouteden, 1910 : 89 (*N. naspirus* var.).

Entire insect normal in coloration and in all other characters, except for the presence of either a large yellow median basal spot or a yellow median band on

the scutellum; the band when present is very well marked and should not be confused with the more or less obscured yellow fascia so often present in this and other species.

I have not seen the type.

Distribution of specimens examined: Cape of Good Hope: Algoa Bay, 1 ♂, 1 ♀, 24.xi.1896; Katberg, 1 ♀. Natal: Karkloof, 1 ♀; Van Reenen, 1 ♂, 1 ♂ (*Bell-Morley*); 1 ♂ (*M'Neale*). Nyasaland: Zomba, 2 ♀♀ (*H. H. Stannus*). Uganda: Mbale, 1 ♀, 6.viii.1911 (*S. A. Neave*).

Type locality, Tanganyika: Kilima Njaro.

Nezara naspirus var. **fasciata** var. n.

Dorsal surface, including the head, yellow, going over the margin on to the ventral surface; with a broad, brown, median stripe from the anterior border of the pronotum to the apex of the scutellum. Colour of rest of insect and all other characters normal.

Type, male, Uganda: Mpumu (*M. Robertson*), in the British Museum. Allotype, female, Uganda: Mitiana-Entebbe, 9.i.1912 (*S. A. Neave*).

Nezara naspirus var. *vittata* Schouteden, 1910.

vittata Schouteden, 1910 : 89 (*N. naspirus* var.).

Dorsal surface green, patterned with yellow as follows: head green; disc of pronotum green, margins, including the posterior, broadly yellow, so that disc entirely surrounded by yellow; apex of scutellum largely yellow encroaching along the side margins, scutellum also with a median yellow spot basally, sometimes joined to the apex by a yellow line; clavus, embolium, base of corium, yellow; connexivum yellow, continued broadly over the margin, green at articulation of the segments. Colour of rest of insect and all other characters normal.

I have not seen the type.

Distribution of specimens seen: Portuguese East Africa: Gaza Land, Mt. Chirinda, 2 ♀♀ (*D. Oderdaal*). Nyasaland: 1 ♀ (*H. H. Stannus*). Congo: W. of Kambove, 1 ♀, 23.x.1907 (*S. A. Neave*). Kenya: Embu, 1 ♂, 26.v.1914 (*C. St. J. O. Browne*). Uganda: 1 ♂; Ruwenzori, Namwamba V., 1 ♂, xii.1934 (*F. W. Edwards*).

Type locality, Tanganyika: Kilima Njaro.

Nezara naspirus var. *personata* Schouteden, 1910.

personata Schouteden, 1910 : 89 (*N. naspirus* var.).

I have seen no specimens. From the description ("*Superne obscure violaceo incarnata* . . .") it is probably a dark or red form, and as such should in my opinion lose its varietal status. This, however, cannot be settled until the type has been examined.

Type locality, Tanganyika: Kilima Njaro.

Nezara similis sp. n.

Antennae. First segment green; second and third segments green, often suffused with reddish-yellow, red apically; fourth, basal third greenish, rest reddish rust; fifth basal third yellowish, rest reddish rust. *Scent gland.* Similar to *N. naspirus*, spout and area both small, but more constant and area tends to be rather larger than *N. naspirus*, area more as fig. 10. *Abdominal spine.* Longer than *N. naspirus*, projecting well between hind

coxae (fig. 7). *Male genitalia.* Ninth segment similar to *N. naspirus* (fig. 18), also variable. Parameres (fig. 28) strongly bilobed, constant in form; the middle lobe present in *N. naspirus* never marked in this species; outer lobe long and curved. *Colour.* Dorsal surface darker, more shining green than *N. naspirus*; calli less yellow; blotching on ventral surface very similar; margin to entire insect yellow; black spots along margin of abdomen very variable, sometimes nearly absent or may be much larger than the spiracles. I have seen one yellow colour variety, and no red forms. *Length* 10·7–12·8 mm., *breadth of pronotum* 6·9–7·9 mm. Very similar in general appearance to *N. naspirus* but easily separated by abdominal spine and male genitalia. Its characters seem to be rather more constant than those of *N. naspirus*.

Type, male, Mt. Cameroon: Musake, 13.i.1932 (*M. Steele*). Allotype, female, same data, both in the British Museum. Paratypes: same data as type, 3 ♂♂, 3 ♀♀; Mt. Cameroon, Onyanga, 1 ♂, 1 ♀, 28.i.1932 (*M. Steele*). Uganda: Mpanga Forest, Toro, 1 ♂, 1 ♀, xi.1911 (*S. A. Neave*); Ruwenzori, 1 ♂, 1.xi.1911 (*S. A. Neave*), 1 ♂ (*Scott-Elliot*), 1 ♂, 15.vii.1912 (*C. C. Gowdey*), Namwamba V., 1 ♂, xii.1934 (*F. W. Edwards*); Mabira Forest, Chagwe, 1 ♂, 17.vii.1911 (*C. C. Gowdey*). Kenya: Mt. Kenya, 2 ♂♂, ii.1911 (*S. A. Neave*).

Nezara similis var. **flavolineata** var. n.

Dorsal surface green with yellow bands somewhat reminiscent of *N. naspirus* var. *vittata*, arranged as follows: head green; pronotal disc green, lateral and anterior margins broadly yellow, going broadly over the margin, hind margin narrowly yellow; scutellum green with a yellow basal spot in the form of a flat isosceles triangle occupying the whole of the basal margin, and combining with the narrow posterior pronotal band to form a band nearly as broad as that along anterior margin of pronotum; scutellar triangle joined to apex of scutellum by a narrow central line; clavus broadly yellow at the base, tapering to near apex of corium; connexivum yellow passing broadly over margin, forming a band on ventral surface nearly as wide as connexivum. Colour of rest of insect and all other characters (of female) similar to type form.

Type, female, Mt. Cameroon: Musake, 13.i.1932 (*M. Steele*), in the British Museum.

Nezara frontalis (Westwood, 1837).

frontalis Westwood, 1837 : 37 (*Pentatoma*). Kirkaldy, 1909 : 116 (*Nezara*).
capicola Dallas, 1851 : 276 (*Rhaphigaster capicola* var. *β*). Stål, 1865 : 195 (*N. capicola* var. b). Distant, 1900 : 813 (*Nezara*).

Antennae. First segment green; second yellowish, probably variable, see var. *capicola* below; third green; fourth and fifth reddish. *Scent gland.* Spout elongate (fig. 11), but not reaching beyond middle of anterior edge of pleuron; evaporating area large, larger than in *N. o* (Sign.). *Abdominal spine.* Short and rounded, as *N. viridula* (fig. 4). *Male genitalia.* I have only seen the type, a female; probably similar to var. *capicola* below. *Colour.* Dorsal surface green, with yellow arranged as follows: anterior half of head yellow; pronotum yellow anterior to a curved line joining posterior angles; base of hemelytra and connexivum yellow, *i.e.* similar to *N. viridula* var. *torquata* (Fabr.). Ventral surface yellowish; black spots along abdominal margin medium sized.

Type, female, Cape of Good Hope, in the Hope Museum, Oxford.

This is obviously a colour variety, the normal form of which is described below (var. *capicola*).

Nezara frontalis var. *capicola* (Westwood, 1837).

capicola Westwood, 1837 : 39 (*Pentatoma*). Dallas, 1851 : 276 (*Rhaphigaster*). Stål, 1865 : 195 (*N. capicola* var. a), and 1876 : 91 (*Nezara*). Kirkaldy, 1909 : 116 (*N. frontalis* var.).
lata Westwood, 1837 : 39 (*Pentatoma*).

Antennae. Similar to the type variety except that the second segment varies from completely red to green with a red apex. *Scent gland* and *abdominal spine* similar to the type variety. *Male genitalia.* Ninth segment (fig. 19), emargination shallow; ventral ridges strong forming a deep pocket, similarly to *N. soror*, only somewhat more strongly developed and bearing a tuft of strong setae each side. Parameres (fig. 29) very characteristic, inner lobe long, other lobes hardly developed. *Colour.* Normal green form; dorsal surface light or dark green, ventral surface lighter yellowish; usually some indication of a central yellow fascia to the scutellum; narrow red or yellow margin to whole insect; black spots along margin of abdomen small to medium sized; abdominal keel yellow. *Length* 12·3–15 mm., *breadth of pronotum* 8–9 mm. Very similar in general appearance to *N. naspirus* but easily separated from it and all other species except *N. o* by the shape of the scent gland orifice; separated from *N. o* by the shape of the scent gland area, male genitalia, and quite different form.

Type (and that of *P. lata*) in the Hope Museum, Oxford.

Distribution of the specimens seen: Cape of Good Hope: Cape Town, 1 ♂, viii.1905 (*G. A. K. Marshall*); Katberg, 2 ♀♀, x.1932 (*R. E. Turner*); Swellendam, 1 ♂, ii.1932 (*R. E. Turner*); ? locality, 2 ♀♀. Natal: Drakensburg, Van Reenen, 4 ♂♂, 2 ♀♀, xi.1932 (*R. E. Turner*), 2 ♂♂, 1 ♀; Karkloof, 3 ♂♂, 4 ♀♀, 14.ii.1897; ? locality, 2 ♀♀. Basutoland: Maseru, 1 ♂ (*L. Wroughton*), 1 ♀, 27.vi.1902 (*R. Crawshay*); Maluti Mts., Nyakoesuba, 1 ♀, 19.ii.1929 (*Hugh Scott*). Orange Free State: Harrismith, 1 ♀.

Type locality, Cape of Good Hope. *P. lata* was described from Sierra Leone.

Nezara frontalis var. *africana* (Westwood, 1837).

africana Westwood, 1837 : 39 (*Pentatoma*). Kirkaldy, 1909 : 116 (*N. frontalis* var.).
capicola Dallas, 1851 : 276 (*Rhaphigaster capicola* var.). Stål, 1865 : 195 (*N. capicola* var. c).

Dorsal surface yellow, with green spots arranged exactly as in *N. viridula* type variety, *i.e.* green tinges by eyes and across articulation of connexival segments; three spots across pronotum; three across base of scutellum; a third row formed by one at apex of scutellum and one on each corium. All other characters similar to *N. frontalis* var. *capicola* (above).

Type, male, Sierra Leone, in the Hope Museum, Oxford.

Nezara frontalis var. **rufopunctata** var. n.

Differs only from *N. frontalis* var. *capicola* by the presence of dark reddish-brown spots on the dorsal surface, arranged as follows: two on front of pronotum, one just behind each callus; one at apex and one at each basal angle of scutellum; one across each articulation of the connexival segments. Hence pattern very similar to that of *N. naspirus* var. *rufoguttata*, though the latter lacks the connexival spots.

Type, male, Cape Province: Swellendam, ii.1932 (*R. E. Turner*) in the British Museum. Paratypes: Natal: Karkloof, 1 ♂, 9.ii.1897; Drakensburg, Van Reenen, 1 ♂, xi.1926 (*R. E. Turner*).

Nezara o (Signoret, 1858).

o Signoret, 1858 : 288 (*Rhaphigaster*). Kirkaldy, 1909 : 116 (*Nezara*). Stål, 1865 : 197 and 1876 : 91 (both as *Nezara*).
orbiculata Distant, 1890a : 476 (*Nezara*) **syn. n.** Kirkaldy, 1909 : 121 (*Nezara*).

Dr. Max Beier sent me two specimens from the Vienna Museum both purporting to be the type of *N. o* (Sign.). One was a species of *Acrosternum* and the other was *N. soror*. Both were from Madagascar, whereas Signoret described *N. o* from W. Africa. Neither specimen agreed with the description which refers to the long abdominal spine of *N. o*, in both these specimens it was short. Neither, therefore, can be the type. Distant's type is in the British Museum, and he only separated it from *N. o* by its larger size, paler margin, and by the second and third antennal segments being subequal in length. The two first are variable characters, and Signoret's description mentions that the first and second segments of the antennae are equal. Hence I have considered the two species as identical, and thus Distant's name must be regarded as a synonym of *N. o* (Sign.).

Antennae. First segment green; rest mainly red with occasional small green blotches; fourth and fifth may be lighter or yellowish basally. *Scent gland.* Spout elongate (fig. 12) resembling that of *N. frontalis*, reaching nearly to middle of anterior margin of pleuron; evaporating area small. *Abdominal spine.* Very long, longer than in any other species of the genus, reaching to the middle coxae (fig. 5). *Male genitalia.* Ninth segment (fig. 20) quite characteristic sinuous emargination; ventral ridges very much reduced, but bearing strong setae. Parameres (fig. 30) quite characteristic, three lobed. *Colour.* Dorsal surface dark green; calli not conspicuously lighter; ventral surface lighter, and distinctly mottled; abdominal keel often green; scutellum with indistinct yellow fascia; margin of whole insect distinctly lighter, but no definite yellow margin; black spots along margin of abdomen small. Here it might be mentioned that the ocelli are smaller than in any other species. I have seen no colour varieties. *Length* 13·8–16·9 mm., *breadth of pronotum* 8·9–10·8 mm. Shape very characteristic, broad oval (fig. 3); the only species with the lateral pronotal margins convex. A very distinct species, unique in most of its specific characters, easily separated from all the other species by its abdominal spine.

Distribution of the specimens seen : Angola : 1 ♂. Congo : Ituri Forest, 1 ♂, 30.iii.1930. Cameroons : Mbile, nr. Badere, 1 ♂, 19.vi.1914; Dengdeng, 1 ♂, 16.vi.1914; D'Ja Posten, 1 ♀, vi.1936 (*F. G. Merfield*); Batouri District, 6 ♂♂, 8 ♀♀, v.1935 (*F. G. Merfield*). S. Nigeria : Yaba, 1 ♂, 1 ♀, 4.iv.1910 (*J. J. Simpson*). Uganda : coll. by C. C. Gowdey : Riubale, 1 ♀, 9.v.1911; Entebbe, 2 ♀♀, 8.viii.1911; Katonga R., 1 ♂, 1 ♀, 4.xi.1913; coll. by S. A. Neave : Entebbe, 1 ♂, 11.i.1912; Buamba Forest, 1 ♀, 3.xi.1911; Budongo Forest, 2 ♀♀, 11.xii.1911; Mbira Forest, Chagwe, 3 ♀♀, vii.1911; N.W. shores Victoria Nyanza, 1 ♂, 1 ♀, 12.ix.1911; Toro, 1 ♂, 25.x.1911. Kenya : Ilala, 1 ♀, 18.vi.1911 (*S. A. Neave*).

Type locality, Nigeria : Old Calabar.

Nezara congo Schouteden, 1905.

congo Schouteden, 1905 : 54 (*Nezara*). Kirkaldy, 1909 : 116 (*Nezara*).

I have been unable to see the type. Schouteden's description says that the pronotum and scutellum are transversely rugose as in *N. niamensis* (Distant).

Type locality, Congo.

List of species of *Nezara* Amy. & Serv., with varieties and more important synonyms :

viridula (Linnaeus, 1758)
var. *smaragdula* (Fabricius, 1775)
var. *torquata* (Fabricius, 1775)
var. *aurantiaca* Costa, 1884
antennata Scott, 1874
var. *icterica* Horváth, 1889
var. *balteata* Horváth, 1889
soror Schouteden, 1905
var. *flava* var. n.
robusta Distant, 1898
var. *virescens* var. n.
var. *thoracica* var. n.
immaculata sp. n.
niamensis (Distant, 1890)
naspirus (Dallas, 1851)
syn. *victorinii* Stål, 1876
var. *subviridula* Schouteden, 1910
var. *subtorquata* Schouteden, 1910
var. *flavocincta* var. n.
var. *rufoguttata* var. n.
var. *maculata* var. n.
var. *scutellaris* Schouteden, 1910
var. *fasciata* var. n.
var. *vittata* Schouteden, 1910
var. *personata* Schouteden, 1910
similis sp. n.
var. *flavolineata* var. n.
o (Signoret, 1858)
syn. *orbiculata* Distant, 1890
frontalis (Westwood, 1837)
var. *capicola* (Westwood, 1837)
var. *africana* (Westwood, 1837)
var. *rufopunctata* var. n.
congo Schouteden, 1905

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